

### **REMARKS**

Claims 11-20 are pending and under examination. No amendments have been made in this response. Applicants respectfully traverse the rejection and objection in the Office Action, where the Examiner:

- (1) rejected claims 11-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Pub. No. 2002/0118916 (“*Lee*”); and
- (2) objected to claim 20 as being dependent upon a rejected base claim, but indicated that it would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### **Regarding the 35 U.S.C. § 103(a) Rejection of Claims 11-19:**

Applicants request reconsideration and withdrawal of the rejection of claims 11-19 under 35 U.S.C. § 103(a) as being unpatentable over *Lee*, because a *prima facie* case of obviousness has not been established.

Specifically, *Lee* does not disclose at least Applicants’ claimed “coupling waveguide ... comprising a tapered core of a substantially constant refractive index” and “receiving waveguide ... comprising a core of a substantially constant refractive index greater than the refractive index of the tapered core of the coupling waveguide;” and “the refractive index of the tapered core of the coupling waveguide is selected so that the first effective refractive index and the second effective refractive index differ from each other in absolute value less than 30% of the difference between the core refractive index and the effective refractive index of the receiving waveguide,” as recited in claim 11.

The Office Action acknowledged that “*Lee* is silent as to the relative refractive indices of the waveguides.” Office Action, page 3. The Office Action then alleged that “[h]owever, it is well known in the art to use waveguides having different refractive indices (as suggested by *Lee*’s reference to a ‘high  $\Delta n$  core’ and a ‘Low  $\Delta n$  Core’).” *Id.* According to the Office Action,

“[i]t would have been obvious to one of ordinary skill in the art at the time of invention to use refractive indices having the claimed relative values in the structure of Lee, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.” *Id.* Applicants respectfully disagree.

Applicants respectfully direct the Examiner’s attention to MPEP § 2144.05(II)(B), which notes that:

[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result- effective variable.).

Contrary to the Office Action’s assertions, the refractive indices (both core and effective) recited in *Lee* are not “result-effective variable[s].” In addition, the Office Action has not established that the relationship between them, or even the existence of a relationship between them, would have been recognized in *Lee* as being result-effective.

First, the Office Action applied *Lee*’s teachings of a high index difference waveguide and a low index difference waveguide and alleged that these teachings suggest that waveguides having the claimed relationship would have been obvious. *See* Office Action, page 3. These allegations are incorrect. The existence of the higher index difference (i. e., index contrast) and the lower index difference is an inherent result of having two waveguides matched to different external waveguides and sharing a common cladding. It does not suggest any particular relationship between the two index contrasts, or that the relationship between the two index contrasts is result-effective, at least because the two core indices recited in *Lee* are selected to

respectively match the two external waveguides being coupled, and not to have any particular relationship with each other. *See Lee*, paragraph [0008].

In addition, the core index and mode size of each core are also selected to match the external waveguides. That is, low loss coupling can be achieved by providing similar properties (e.g., matching) between the cores and waveguides. *See Lee*, paragraph [0018]. However, *Lee*'s matching of each of the two cores to difference external waveguides from different optical components (*see Lee*, paragraph [0005]) suggests nothing about the relationship between the properties of the two cores. That is, the relationship between the properties of the two cores cannot be result-effective at least because the intended purpose of *Lee*'s mode transformer is to match to existing optical components that need to be coupled together, which does not necessarily have a particular relationship between such optical components.

Second, even if, for discussion purposes only, the optical properties identified by the Office Action are significant in *Lee*, these optical properties (i.e., high index *difference* and low index *difference*) are not the same optical properties recited in claim 11. That is, the "refractive index difference" identified by the Office Action is not the same optical property as the "core refractive index" or the "effective refractive index" recited in claim 11. On the other hand, the only mentioning of effective refractive index in *Lee* (*see Lee*, paragraphs [0008-0010], [0018], and [0033]) are mere statements that the effective index in the tapered region gradually changes as the waveguide tapers. However, *Lee* does not teach or suggest that the effective index, by itself (or even the effective index *difference*), is a result-effective variable. In particular, every mention in *Lee* of an effective refractive index refers only to the tapered portion, and *Lee* makes no mention at all of the effective indices at the input or output of the transformer or their significance.

Third, *Lee* does not recognize the particular relationship between the optical properties recited in claim 11 as being result-effective. For example, the last paragraph of claim 11 recites a relationship not only between the first and second effective refractive indices (which *Lee* does not recognize as being result-effective, as discussed above), but also between the “core refractive index and the effective refractive index of the receiving waveguide.” The Office Action does not show any relationship between the core index and the effective index that is disclosed by *Lee* and also recognized as result-effective. Again, the index difference (or index contrast) identified by the Office Action, which depends on the cladding index, is not the same optical properties that are recited in claim 11.

Moreover, as discussed in the Request for Reconsideration filed October 27, 2010, *Lee* makes essentially no mention of any relative properties between the first and second core indices. Referring to paragraph [0029] of *Lee*, the only disclosed relationships between the actual refractive indices  $n_1$ ,  $n_2$ ,  $n_3$  are that  $n_1$  and  $n_2$  are different (otherwise, no transformer is needed in the first place), and the cladding index  $n_3$  is low enough to function as a cladding for both  $n_1$  and  $n_2$ . Depending on the external waveguides being coupled (which are not specified in *Lee*, and could therefore be arbitrarily selected), the Office Action has shown no indication that it is even possible, let alone desirable, to modify the teachings of *Lee* to obtain the relative optical properties recited in claim 11 while still maintaining the parameters and relationships explicitly required by *Lee* to ensure that the principle of operation of *Lee* is not changed.

As such, the features of claim 11 which are not expressly disclosed by *Lee* (acknowledged by the Office) are also not rendered obvious by *Lee*, at least because *Lee* does not recognize the claimed optical properties as result-effective variables. Therefore, the Office’s allegation of obviousness based on optimization of ranges is premature, and a *prima facie* case of obviousness has not been established.

Thus, independent claim 11 should be allowable over *Lee*. Independent claim 19, while of different scope, contains recitations similar to those of claim 11, and therefore should also be allowable for at least the same reasons as claim 11. Dependent claims 12-18 should be allowable at least by virtue of their dependence from base claim 11, and because they recite additional features not disclosed in *Lee*. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection.

**Regarding the Objection to Claim 20:**

As discussed above, claim 19 should be allowable over *Lee*. Therefore, Applicants respectfully request withdrawal of the objection to claim 20 which depends from allowable base claim 19.

**Conclusion:**

Applicants request reconsideration of the application and withdrawal of the rejections and the objection. Pending claims 11-20 are in condition for allowance, and Applicants request a favorable action.

The Office Action contains a number of statements reflecting characterizations of the cited references and the claims. Regardless of whether any such statements are identified herein, Applicants decline to automatically subscribe to any such statements or characterizations in the Office Action.

If there are any remaining issues or misunderstandings, Applicants request the Examiner telephone the undersigned representative to discuss them.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account no. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: April 11, 2011

By: 

David M. Longo  
Reg. No. 53,235

/direct telephone: (571) 203-2763/